

**CLAIMS**

I claim:

1. A substantially spherical aircraft, said aircraft having buoyancy apparatus operable to maintain said aircraft aloft, propulsion and directional apparatus co-operable to conduct said aircraft; and at least one boundary layer separation suppression element operable to encourage said aircraft to proceed as conducted.
2. The substantially spherical aircraft of claim 1 wherein said propulsion apparatus includes a pusher propeller.
3. The substantially spherical aircraft of claim 2 wherein said aircraft has a main diametral dimension, D1, and said propeller has a diameter D2, where D2 lies in the range of 10 % to 25 % of D1.
4. The substantially spherical aircraft of claim 2 wherein said pusher propeller operates between 0 and 250 r.p.m.
5. The substantially spherical aircraft of claim 2 wherein said pusher propeller has a tip speed of less than 500 ft/s.
6. The substantially spherical aircraft of claim 2 wherein said pusher propeller is driven by an electric motor.
7. The substantially spherical aircraft of claim 6 further including an internal combustion engine and an electric generator driven thereby.
8. The substantially spherical aircraft of claim 1 wherein said aircraft has a fuel replenishment system, said fuel replenishment system being operable while said aircraft is aloft.
9. The substantially spherical aircraft of claim 1 wherein at least one of said propulsion and directional apparatus includes an internal combustion engine and a fuel replenishment system, said fuel replenishment system being operable while said aircraft is aloft.

10. The substantially spherical aircraft of claim 1 wherein said aircraft has solar cell panels.
11. The substantially spherical aircraft of claim 1 wherein said aircraft includes an electro magnetic interface member chosen from the set of electro-magnetic interface members capable of performing at least one of (a) receiving an electro-magnetic wave form; (b) sending an electro-magnetic wave form; (c) relaying an electro-magnetic wave form; and (c) reflecting an electro-magnetic wave form.
12. The substantially spherical aircraft of claim 1 wherein said aircraft includes communications equipment operable to perform at least one of (a) receiving communications signals (b) sending communications signals; (c) relaying communications signals; and (d) reflecting communications signals.
13. The substantially spherical aircraft of claim 1 wherein said aircraft includes surveillance equipment.
14. The substantially spherical aircraft of claim 13 wherein said surveillance equipment is chosen from the set of surveillance equipment consisting of at least one of (a) communications monitoring equipment; (b) thermal imaging equipment; (c) photographic equipment; and (d) radar.
15. The substantially spherical aircraft of claim 1 wherein said aircraft has a cowling, and said cowling is substantially transparent to at least radio frequency electro-magnetic waves.
16. The substantially spherical aircraft of claim 15 wherein said aircraft has, mounted within said cowling, at least one of:
  - (A) communications equipment operable to perform at least one of (a) receiving communications signals (b) sending communications signals; (c) relaying communications signals; and (d) reflecting communications signals; and
  - (B) surveillance equipment chosen from the set of surveillance equipment consisting of at least one of (a) communications monitoring equipment; (b) thermal imaging equipment; (c) photographic equipment; and (d) radar.
17. The substantially spherical aircraft of claim 15 wherein said cowling is internally pressurised relative to ambient conditions external to said aircraft.

18. The substantially spherical aircraft of claim 1 wherein said aircraft is remotely controlled.

19. A substantially spherical aircraft, said substantially spherical aircraft having a weight and an internal volume, said aircraft having buoyancy apparatus operable to maintain said aircraft aloft, propulsion and directional apparatus co-operable to conduct said aircraft; said buoyancy apparatus includes an envelope mounted within said aircraft, and said envelope contains a buoyant lifting fluid; and said envelope is variably inflatable to occupy a variable portion of said internal volume; and under ambient conditions at sea level on a 59 F day, when said envelope is inflated to as little as 70 % of said internal volume, said envelope provides a buoyant force at least as great as said weight, and said aircraft having at least one of:

(A) communications equipment operable to perform at least one of (a) receiving communications signals (b) sending communications signals; (c) relaying communications signals; and (d) reflecting communications signals; and

(B) surveillance equipment chosen from the set of surveillance equipment consisting of at least one of (a) communications monitoring equipment; (b) thermal imaging equipment; (c) photographic equipment; and (d) radar.

20. A method for operating a buoyant aircraft, said method comprising the steps of:

providing an aircraft of substantially spherical shape, said aircraft having an internal volume, and a weight, said aircraft including an inflatable envelope housed within said internal volume, and said aircraft having a propulsion system and a directional control system;

inflating said envelope with a lifting fluid to a first volume sufficient to at least balance said weight, said first volume, at sea level, being less than 70 % of said internal volume; and

operating said propulsion and directional control systems to a location greater than 10,000 ft above sea level.

21. The method of claim 20 wherein said method includes the step of maintaining said aircraft in a loitering location.

22. The method of claim 21 wherein said step of loitering maintaining said aircraft in said loitering position includes the step of maintaining lateral and longitudinal position variation relative to a deviation radius of 1000 M.

23. The method of claim 22 including maintaining said aircraft at an altitude of at least 15,000 ft.

24. The method of claim 20 and further including at least one of the steps chosen from the set of steps consisting of:

(A) operating as a communications platform to do at least one of (a) receiving communications signals (b) sending communications signals; (c) relaying communications signals; and (d) reflecting communications signals; and

(B) operating as a surveillance platform to (a) monitor communications; (b) produce thermal imaging; (c) take photographs; and (d) to operate a radar.

25. The method of claim 20 including the step of controlling operation of said buoyant aircraft from a remote location.